

### **REMARKS**

Applicants thank the Examiner for the thorough examination given the present application.

#### **Status of the Claims**

Upon entry of the present amendment, claims 1-10 and 12-16 will be pending in the above-identified application. Claims 1, 4-5, and 8-10 have been amended. Claims 12-16 have been added. Support for the recitations in claim 1 can be found in the present specification, *inter alia*, at pages 8 and 13. Claims 4 and 8-9 have been amended to change their dependency. Claim 5 has been amended in accordance with the Examiner's suggestions. Claim 10 has been rewritten into independent form. Support for new claims 12-16 can be found in claims 2, 3, 4, 8, and 9, respectively, as originally filed. No new matter has been added. Based upon the above considerations, entry of the present amendment is respectfully requested.

In view of the following remarks, Applicants respectfully request that the Examiner withdraw all rejections and allow the currently pending claims.

#### **Issues under 35 U.S.C. § 112, second paragraph**

The Examiner has rejected claims 1, 5, and 8-9 under 35 U.S.C. § 112, second paragraph, as being indefinite. Applicants respectfully traverse in view of the amended claims.

With respect to claim 5, the Examiner asserts that the phrase "a powdery catalyst" is unclear. Applicants have amended the phrase to recite "a powdery catalyst active substance." Applicants respectfully submit that this amendment overcomes the outstanding rejection and request that the rejection be removed.

Regarding claims 8-9, the Examiner asserts that the phrase "the substrate" lacks sufficient antecedent basis. These claims have been amended to depend from claim 4, which provides proper antecedent basis. As such, Applicants respectfully submit that this amendment overcomes the outstanding rejection and request that the rejection be removed.

**Issues under 35 U.S.C. § 103(a)**

1) The Examiner has rejected claims 1-10 under 35 U.S.C. § 103(a) as being unpatentable over Yokota et al. '063 (US 4,625,063) in view of Mizumoto et al. '263 (US 4,631,263).

2) The Examiner has rejected claims 6-7 under 35 U.S.C. § 103(a) as being unpatentable over Yokota et al. '063 and Mizumoto et al. '263 in view of Nishino et al. '355 (JP 55-149355).

Applicants respectfully traverse. Reconsideration and withdrawal of the rejections are respectfully requested based on the following considerations.

**Legal Standard for Determining Prima Facie Obviousness**

MPEP 2141 sets forth the guidelines in determining obviousness. First, the Examiner has to take into account the factual inquiries set forth in *Graham v. John Deere*, 383 U.S. 1, 17, 148 USPQ 459, 467 (1966), which has provided the controlling framework for an obviousness analysis. The four *Graham* factors are:

- (a) determining the scope and content of the prior art;
- (b) ascertaining the differences between the prior art and the claims in issue;
- (c) resolving the level of ordinary skill in the pertinent art; and
- (d) evaluating any evidence of secondary considerations.

*Graham v. John Deere*, 383 U.S. 1, 17, 148 USPQ 459, 467 (1966).

Second, the Examiner has to provide some rationale for determining obviousness. MPEP 2143 sets forth some rationales that were established in the recent decision of *KSR International Co. v. Teleflex Inc.*, 82 USPQ2d 1385 (U.S. 2007). Exemplary rationales that may support a conclusion of obviousness include:

- (a) combining prior art elements according to known methods to yield predictable results;
- (b) simple substitution of one known element for another to obtain predictable results;
- (c) use of known technique to improve similar devices (methods, or products) in the same way;

(d) applying a known technique to a known device (method, or product) ready for improvement to yield predictable results;

(e) “obvious to try” – choosing from a finite number of identified, predictable solutions, with a reasonable expectation of success

(f) known work in one field of endeavor may prompt variations of it for use in either the same field or a different one based on design incentives or other market forces if the variations are predictable to one of ordinary skill in the art;

(g) some teaching, suggestion, or motivation in the prior art that would have led one of ordinary skill to modify the prior art reference or to combine prior art reference teachings to arrive at the claimed invention.

As the MPEP directs, all claim limitations must be considered in view of the cited prior art in order to establish a *prima facie* case of obviousness. *See* MPEP 2143.03.

### The Present Invention

As amended, independent claim 1 recites:

A film-type catalyst for production of a tertiary amine, which is used in producing a tertiary amine from an alcohol and a primary or secondary amine as the starting material;

wherein said film-type catalyst has a thickness of 500  $\mu\text{m}$  or less and a pore volume of not less than 0.5 mL/m<sup>2</sup>.

The catalyst layer of the present invention is porous. As such, the claimed invention has an advantage in that the catalyst layer and the reactants can be in good contact with each other so that the reaction proceeds well.

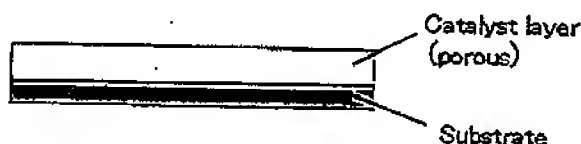
The catalyst film of the present invention is very thin as defined in claims 1 and 10. For this reason, the production yield is unexpectedly increased.

### Distinctions over the Cited Art

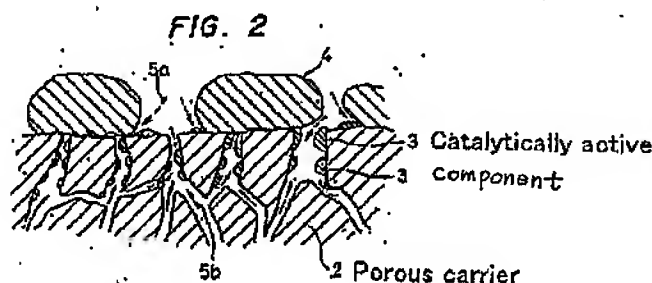
As the Examiner admits, Yokota et al. ‘063 fail to disclose using a film-type catalyst. Accordingly, the present invention is different from Yokota et al. ‘063 since the present invention is a film catalyst and Yokota et al. ‘063 disclose a powder catalyst.

The Examiner relies on Mizumoto et al. '263 to overcome this deficiency. However, Mizumoto et al. '263 also suffer from deficiencies. Specifically, the present invention is different from Mizumoto et al. '263 because the catalyst layer of the present invention is porous. In stark contrast, the substrate/carrier of Mizumoto et al. '263 is porous. See below.

The invention



Mizumoto



Moreover, as shown in amended claims 1 and 10, the thickness of the catalyst film or the catalyst layer is 500  $\mu\text{m}$  or less and the catalyst layer has a pore volume of not less than 0.5  $\text{mL/m}^2$ . Because of these features, side reactions are suppressed in the production of an intended tertiary amine, and the reaction proceeds efficiently.

As supported by Examples 4 and 5 of the present specification, the production rate of a side product changes with changed thicknesses of the catalyst layer. The test data proves that the inside of the catalyst is useful and effective in the reaction.

In comparison, Mizumoto et al. '263 show a support member being porous through which a reaction gas ( $\text{H}_2$ ) passes. In Mizumoto et al. '263, the thickness of the catalyst layer will not have any influence on the production yield and is considered only for economical reasons. Moreover, the catalyst layer of Mizumoto et al. '263 is not porous. Mizumoto et al. '263 show a thin catalyst layer for economical reasons but do not show that the catalyst layer will suppress any side reactions.

Referring to the figures of Mizumoto et al. '263, the catalyst 1 is carried on the surface of the carrier 2 or support and inside the carrier. The catalyst consists of a catalytically active component 3. According to Mizumoto et al. '263, gas/liquid reactions in the presence of a water-repellent catalyst proceed through formation of three-phase interfaces on the surfaces of the catalyst, and the inside of the catalyst is never or scarcely used as sites for the reaction (col. 2, lines 33-41). As such, the inside of the carrier or support of Mizumoto et al. '263 is not equivalent to the catalyst layer of the present invention.

For the reasons given above, Yokota et al. '063 and Mizumoto et al. '263 show different structures of a film catalyst from each other and their combination would not be obvious to one of ordinary skill in the art. Even if the Yokota et al. '063 reference is combined with Mizumoto et al. '263, the present invention provides unexpected and unpredictable results.

As discussed above, Yokota et al. '063 in view of Mizumoto et al. '263 do not disclose each and every aspect of independent claim 1, from which claims 6-7 ultimately depend. Applicants respectfully submit that Nishino et al. '355 do not overcome the deficiencies of these references.

To establish a *prima facie* case of obviousness of a claimed invention, all of the claim limitations must be disclosed by the prior art or be known in the art. As discussed above, the cited references fail to disclose all of the claim limitations of independent claims 1 and 10, and those claims dependent thereon. Therefore, a *prima facie* case of obviousness has not been established, and withdrawal of the outstanding rejections is respectfully requested.

As stated in *KSR International Co. v Teleflex Inc.*, 82 USPQ2d 1385, 1396 (2007), "rejections on obviousness cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness." Furthermore, the mere fact that references *can* be combined or modified does not render the resultant combination obvious unless the results would have been predictable to one of ordinary skill in the art. *Id.* As described above, Applicants have shown that the present invention achieves unexpected and unpredictable results.

For the reasons given above, the combination of references does not render the present invention obvious because the cited references or the art as a whole do not disclose at least one feature of the present invention and its effects. Furthermore, the cited references or the knowledge in the art provide no reason or rationale that would allow one of ordinary skill in the art to arrive at the present invention as claimed. Any contentions of the USPTO to the contrary must be reconsidered at present.

#### **Newly Proposed Claims 12-16**

Applicants have newly proposed claims 12-16 in an effort to further define the scope of protection owed to Applicants. Applicants respectfully submit that claims 12-16 are allowable for the reasons given above. As such, Applicants respectfully assert that claims 12-16 clearly define over the prior art of record, and an early action to this effect is earnestly solicited.

#### **CONCLUSION**

A full and complete response has been made to all issues as cited in the Office Action. Applicants have taken substantial steps in efforts to advance prosecution of the present application. Thus, Applicants respectfully request that a timely Notice of Allowance issue for the present case clearly indicating that each of claims 1-10 and 12-16 are allowed and patentable under the provisions of title 35 of the United States Code.

Should there be any outstanding matters that need to be resolved in the present application, the Examiner is respectfully requested to contact Chad M. Rink, Reg. No. 58,258 at the telephone number of the undersigned below, to conduct an interview in an effort to expedite prosecution in connection with the present application.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37.C.F.R. §§1.16 or 1.17; particularly, extension of time fees.

Dated: FEB 13 2009

Respectfully submitted,

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